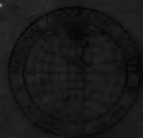


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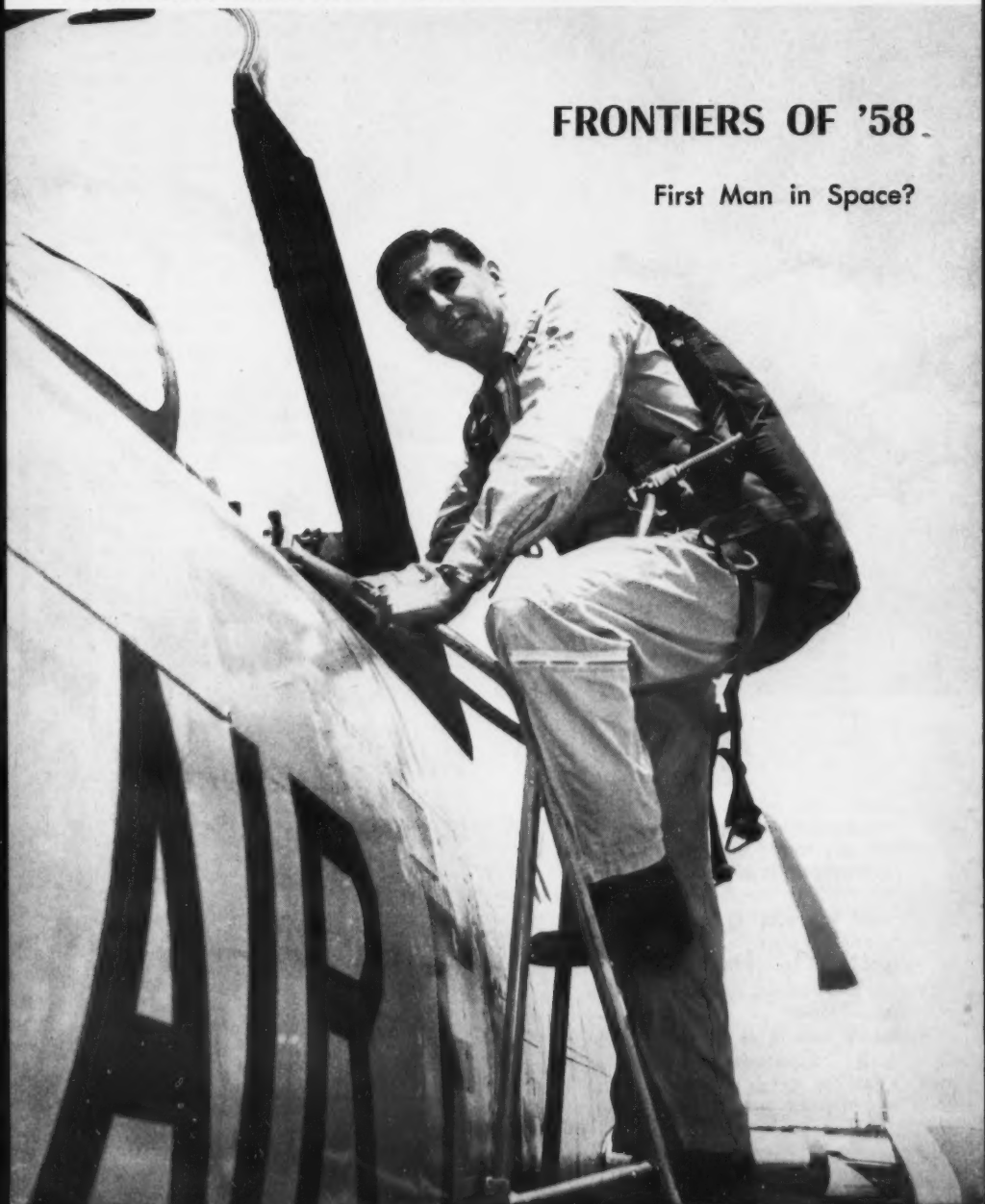


THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

VOLUME XXXVI, NUMBER 30, MAY 19, 1958 . . . *Final Issue, See Page 369 for Renewal*

## FRONTIERS OF '58

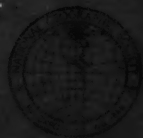
First Man in Space?



UMI

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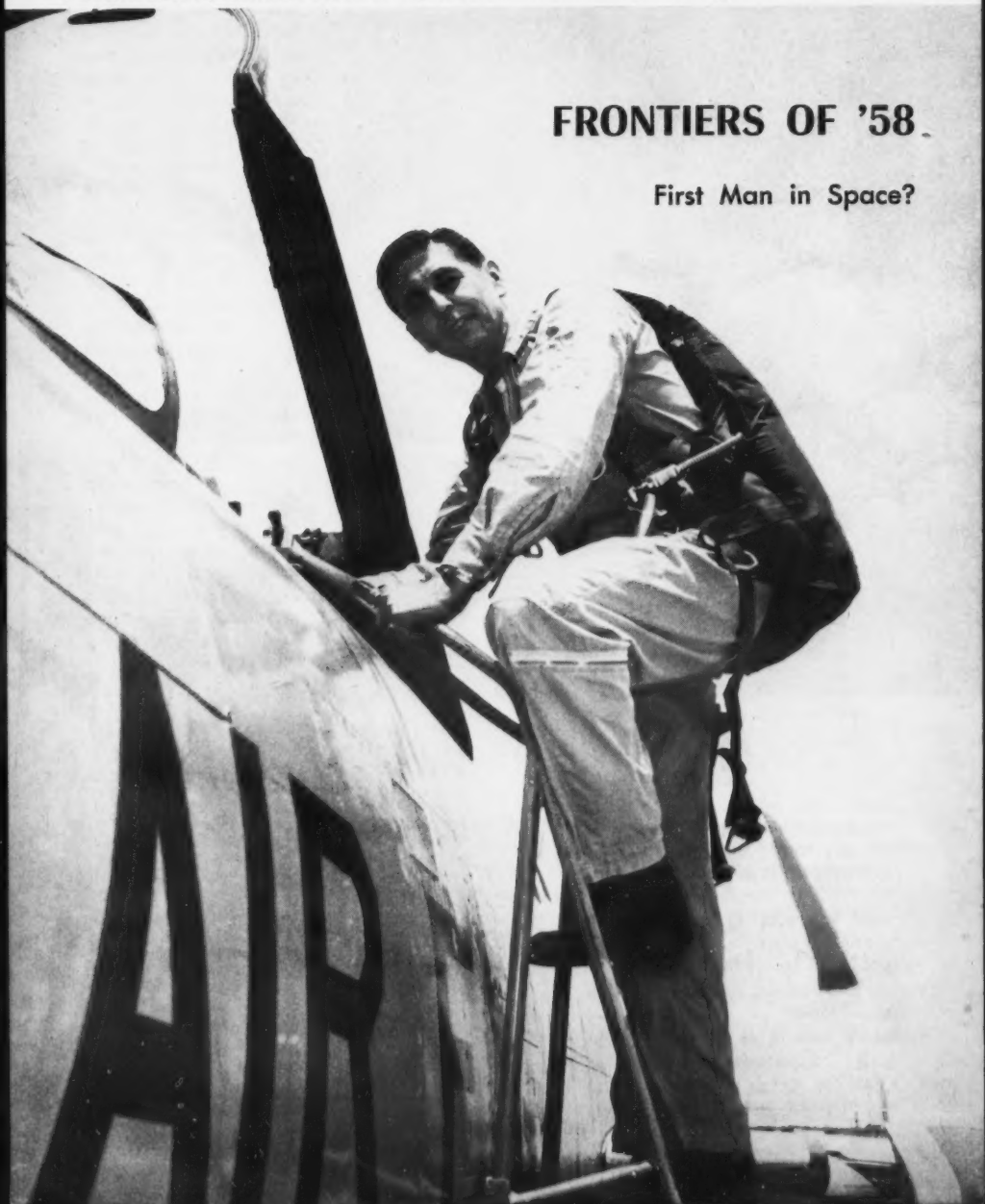


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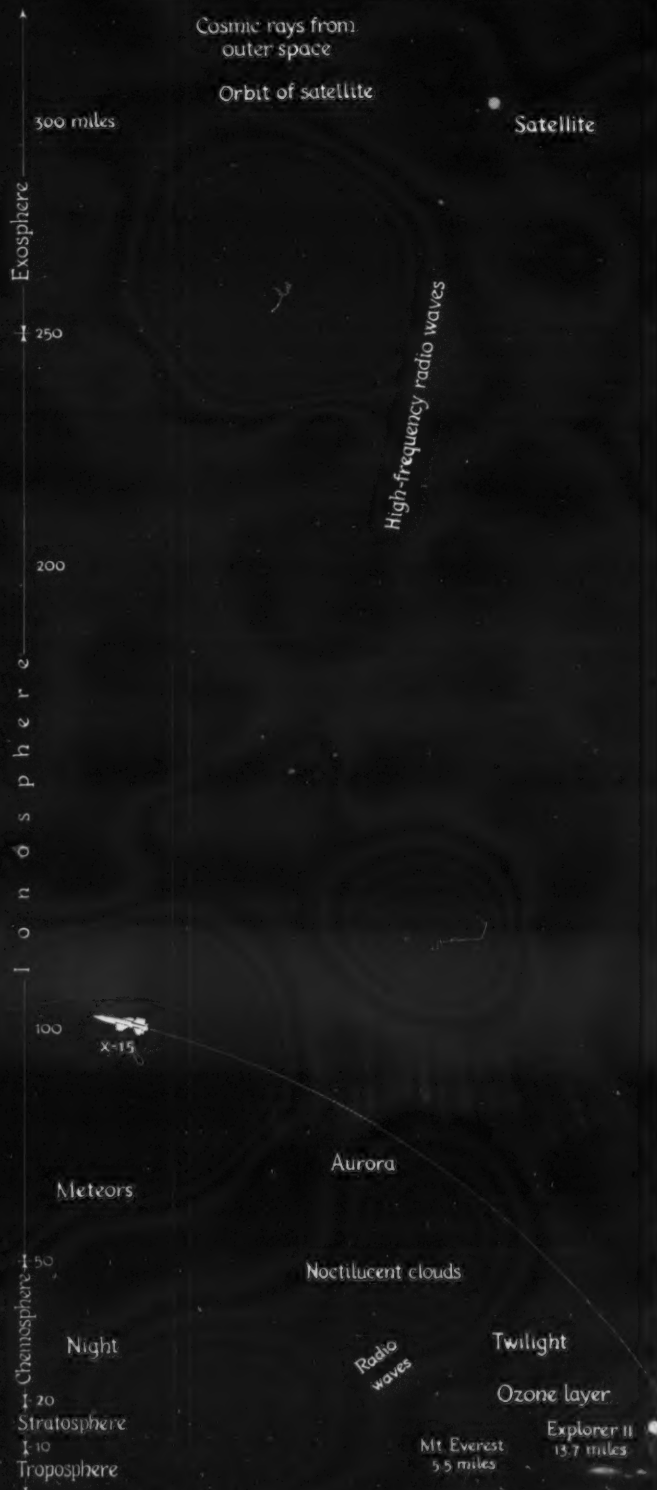
## FRONTIERS OF '58

First Man in Space?



UMI





GULPING its liquid oxygen fuel, the X-15 will use up all its power during a steep climb. Well into the ionosphere, above the point where meteors flash into incandescence, above the drapery of aurora, the silent plane will hurtle through its arching flight. Crossfield will become weightless. Small jets of hydrogen peroxide will keep the nose straight, the wings aligned.

Re-entering the denser atmosphere, the nickel-steel alloy skin of the X-15 will redden at 1,000°F. Insulation and air conditioning will keep Crossfield from broiling.

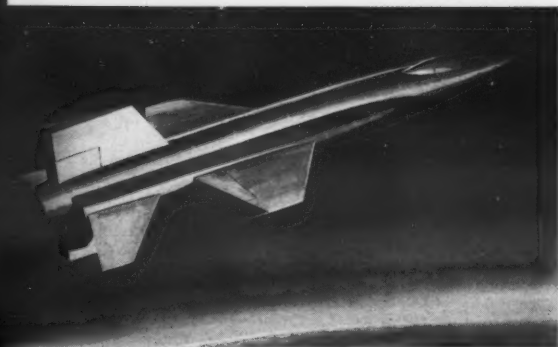
Satellites have pierced this frontier. Information from them indicates that heavy radiation exists above 650 miles, that meteorites seldom strike a space vehicle. The X-15, in turn, will disclose new secrets and change other concepts.

The chart shows space subjects discussed in this year's *Geographic School Bulletins*—meteors, aurora, a baby "moon," the Explorer II balloon (see index).

E.P.

PAINTING BY  
NATIONAL GEOGRAPHIC ARTIST  
WILLIAM N. PALMSTROM  
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363



HALF PLANE, half missile, the North American X-15 is man's first, primitive spaceship. It is built to carry a human being into the edge of space—that most inhospitable frontier that lies so tantalizingly close overhead. Seen here in an artist's concept, the X-15 will fly late this year.

COVER shows a pilot boarding an Air Force jet. This Space-Age Columbus will rocket to the unknown.

## X-15 AND ITS PILOT AIM AT SPACE

FIRST MAN to fly the X-15 will be North American's test pilot and design specialist, Scott Crossfield. To check the rocket plane, he will climb higher than 100 miles and fly faster than one mile per second.

To survive the physical effects of such a speed and altitude (four times higher than any man has flown before) Crossfield is undergoing rigid tests. Laboratory machines mimic almost all conditions of the flight—the pressure of acceleration, the buffeting of high speed.

Here, the man slated to explore the edge of space steps from a Navy centrifuge—a giant top in which he has been subjected to the crushing pressure of centrifugal force. Crossfield's full pressure suit will keep him alive in the near-vacuum 100 miles up.



PHOTOGRAPHS BY NORTH AMERICAN AVIATION, INC., ABOVE AND COVER

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# SOUTH POLE—AMERICAN TOWN

IGY Personnel, Under "Mr. Antarctica," Hold Down  
Man's Bleakest Settlement, at the End of the Earth

PHOTOGRAPHS BY THOMAS J. ABERCROMBIE, NATIONAL GEOGRAPHIC STAFF




DR. PAUL A. SIPLE, chief scientist at the South Pole, has visited the last frontier continent since boyhood. His timely report appears exclusively in the April, 1958, *National Geographic*.

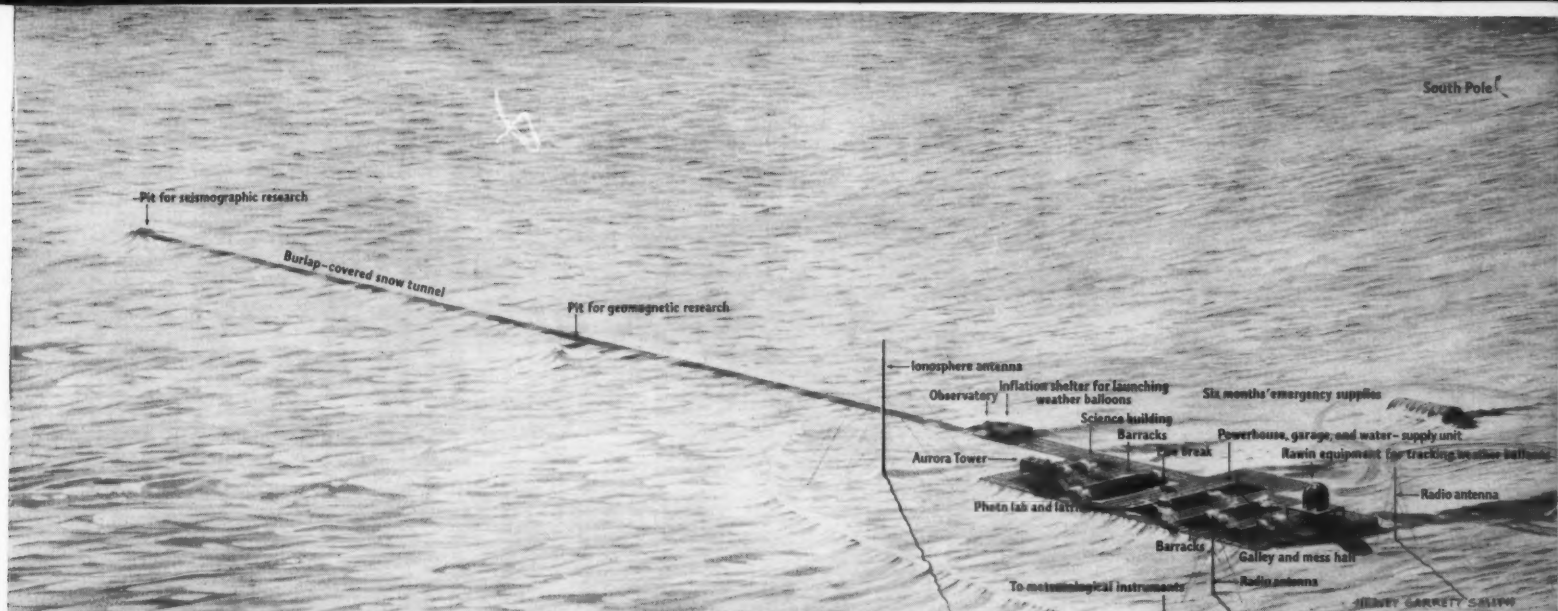


**D**URING the six dark months of Antarctica's past winter, 18 Americans endured earth's coldest temperatures at science's uttermost outpost—the South Pole. Breaking the continent's secrets, they compiled a wealth of data for International Geophysical Year.

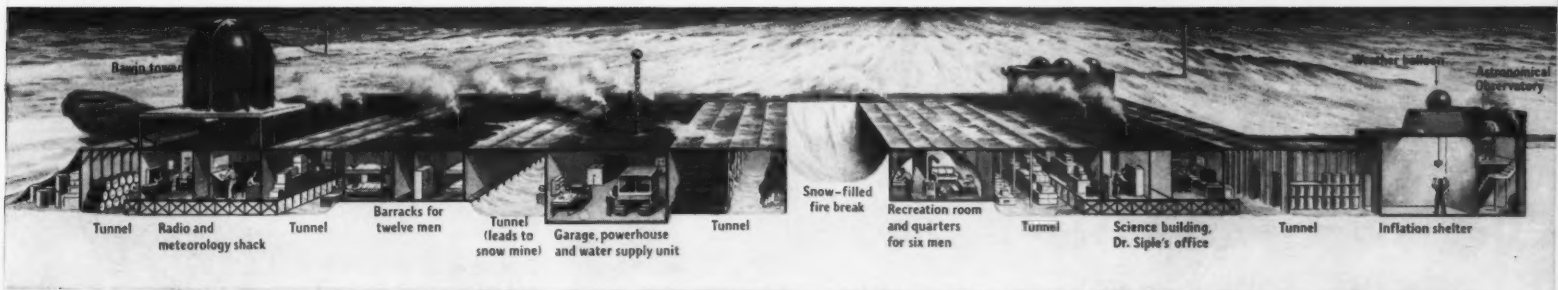
Their base stays manned and probably will remain a scientific laboratory. Its floor is 8,300 feet of ice, on 900 feet of rock. Its domes, chimneys, and masts, peeking above the snow, are lashed by 50-mile-an-hour winds. Meteorologists brave the cold to check instruments, left. On 169 consecutive days last winter, temperatures huddled below  $-40^{\circ}$ . A cold snap produced  $-102^{\circ}$ , a record only recently broken.

A snow-smothered village, right, the United States South Pole Station had residential and business sections, a recreation center, warehouses, even a community flag—at the Pole itself. 





UMI



PAINTING BY HERVEY GARRETT SMITH, © NGS

## Science Probes New Power Source

**G**REAT Britain spawned the industrial revolution, as any junior high student knows. To run its mills, coal has been steadily mined from its green pastures and tumbling hills. Today, British coal supplies are running thin. There is no oil on the little islands—all supplies come from overseas.

To fill the gap, Great Britain has kept one alert eye peeled for new sources of power. When the atomic age dawned, the British began experimenting with atomic energy as the logical answer.

Early this year, scientists at the Atomic Energy Research Establishment at Harwell, England, announced that they are taking a step toward harnessing the energy gained by joining atoms. The

element they use is deuterium, a heavy form of hydrogen. Fusing two nuclei of deuterium atoms releases heat. On a gigantic scale, this thermonuclear energy, stored in a hydrogen bomb, can wipe out a city. But it also can be controlled to help man instead of obliterate him.

Experiments at Harwell, then, are exploring a frontier of incalculable importance, not only to Great Britain, where the need for power is pressing, but for all the world. Old resources are gradually diminishing. Atomic energy can someday replace them.

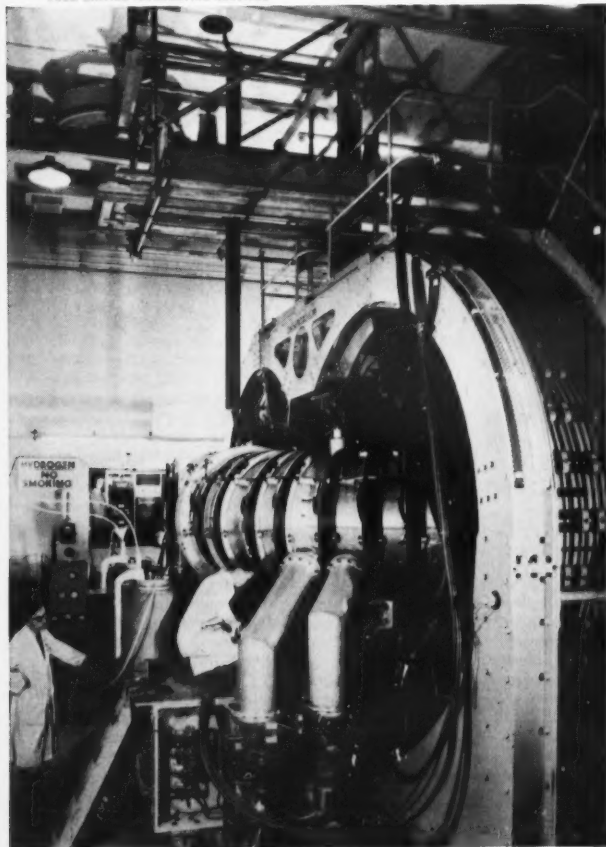
A British science writer points out that a bucket of water contains about a fifth of a gram of "heavy hydrogen" (deuterium). When scientists are able to extract

all thermonuclear energy from this small amount of gas, it will do the same work as two tons of coal. In other words, as long as rain falls, as long as rivers run and the oceans lap our shores, the world need never worry about power.

Harwell is not the only atomic energy plant working toward that goal. The British Zero Energy Thermonuclear Assembly (Zeta), left, produced temperatures of 5,000,000° C., about a third of the estimated temperature at the heart of the sun. Recently, more heat has been created. To furnish power economically a thermonuclear device will have to release some 100,000,000° C.

Main problem is to keep fantastic heat away from container walls. Zeta did this by "squeezing" hot gas in an electromagnetic field—an achievement that raised hopes as well as temperatures. E.P.

FROM BRITISH INFORMATION SERVICES





ON EARTH'S surface, one stretch of land remained to be crossed—the hostile, ice-shrouded continent of Antarctica. Polar explorer Sir Ernest Shackleton called it the "last grand journey left to man."

At 1:47 p.m., March 2, 1958, that journey ended. Dr. Vivian E. Fuchs, a 47-year-old British scientist, pulled up at Scott Station on McMurdo Sound. Behind him lay 2,100 ice-glaring miles, freshly scarred by the spiked tracks of his weasels and sno-cats (right).

A veteran explorer-scientist, Sir Vivian Fuchs (as he is now called) had a part to play in the International Geophysical Year. His methodical survey, carried out through bitter hardship and breath-taking danger, traced a ribbon of knowledge across the blank wastes of man's last frontier land.



PHOTOGRAPHS FROM BRITISH INFORMATION SERVICES



## TWO THOUSAND MILE TREK CONQUERS LAST CONTINENT

**D**R. Fuchs led the Commonwealth Trans-Antarctic Expedition from Britain's Shackleton Station last November 24. Hopefully, he allowed 100 days to make the trek across the heart of Antarctica and escape being trapped by the polar night.

The trip took him exactly 99 days—with time off for a hot shower at the United States South Pole station (previous pages). At regular intervals the expedition paused to bore a 36-foot hole and fire an explosive charge beneath the snow. Seismographs picked up the reverberations of each blast, tracing the pattern of the land contours, smothered by snow and ice. Other instruments measured gravity.

Skin peeled off bare fingers as men checked equipment. White-outs—blinding curtains of snow glare—forced drivers to steer by magnetic compass. Sometimes, vertical ice cliffs delayed progress; sometimes vehicles broke through roofs of ice caverns. When motors stopped, utter silence fell.

Fuchs found his way to the Pole across a previously unknown region, supporting himself with his cargo of supplies. From the Pole on, the going was easier, thanks to Sir Edmund Hillary, conqueror of Mount Everest, who had set up regular supply depots for this last leg of the journey.

One result of the epic adventure was to gain proof that, along the expedition's route, at least, Antarctica consists of solid land, not a series of islands buried by ice. Fuchs found no interior mountains comparable to those hoisting 15,000-foot peaks not far inland from McMurdo. But many crevasses gave clues to mountain tops not far below. Antarctica slopes generally upward from Weddell Sea to McMurdo Sound.

Bearded and happy, the Briton remarked, "We did what we set out to do." S.H.

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- portunities 107; Puerto Rico 128; Tim Wood's cruise 57; Univ. of Arkansas 32
- Egypt** Sphinx 234; Syrian union 230-231
- England** Harwell 367; lighthouses 190-192; London 44-45, 132
- Ethiopia** 203-204
- Europe** See Balearic Islands; Belgium; Channel Islands; England; France; Gibraltar; Italy; Marken; Netherlands; Norway; Sardinia; Spain; Switzerland; Turkey; Wales
- Exploration** See Antarctic regions; Balloons; Columbus; Cook; Northwest Passage; Rockets; Satellites; Space; Undersea
- Factories and mills** crayon 200-202; steel 116, 117
- Fair** Brussels World's Fair 12
- Federation of Rhodesia and Nyasaland** 26-29, 222
- Fish and fishing** Arkansas 31; coelacanth 89; Israel, seine 257; Laos, traps 328; menhaden 214; Sargasso Sea 8-9; tuna 187
- Florida** Cape Canaveral 58, 235, 313; Corkscrew Swamp 216; Intracoastal Waterway 215; sponges 166-168
- Fortifications** Agadir, Morocco 87; Fort Stevens, Washington, D. C. 198-199; Old Fort Mackinac 335
- France** Lafayette 20-21; Lyon 317 See also Algeria; Tahiti
- Fuchs, Dr. Vivian E.** 366
- Gibraltar** 65
- Great Britain** See England; Wales
- Greenland** icecap 154-156
- Grosvenor, Dr. Melville B.** 136, 154-155, 216, 252
- Guatemala** 322-324
- Gypsies** Spain 150-151
- Halloween** Jack O'Lantern 46
- Harbors and ports** Argentina 304, 307; Baltimore 213; Colombo 40; Duluth 346; Kabara 221; Mobile 118; Moji 111; New York 226-228; Norway 271; Santa Cruz de Tenerife 352; Tarpon Springs 166-168; Vancouver 82-84, 339
- Illinois** 296, 297
- India** elephants 268, 269
- Indians** South America 146-148, 172; U. S. 47-48, 64, 176, 178, 299
- Indochina** See Cambodia; Laos; Viet Nam
- Indonesia** See Sumatra
- Industries** See Agriculture; Crafts; Factories and mills; Logs and logging; Mines and minerals; Oil; Trees
- Insects** Kungu flies 29; monarch butterfly 149
- Inside Passage** 338-340
- International Geophysical Year** 272, 318, 319 See also Antarctic regions; Atomic energy research; Rockets; Satellites; Space
- Iraq** 246-249
- Islands** See Bahamas; Balearics; Canary; Ceylon; Channel; Cuba; Japan; Mackinac; Marken; New Guinea; Okinawa; Pacific; Philippines; Pitcairn; Puerto Rico; Sardinia; Sumatra; Tahiti; Tierra del Fuego; Trinidad; Zanzibar
- Israel** 253-257; Negev 258
- Italy** Val d'Aosta 333 See also Sardinia
- Japan** Kyushu 109-111 See also Trees, cherry
- Jefferson, Thomas** memorial 276, 355
- Kansas** 298-300
- Lafayette, Marquis de** 20-21
- Laos** 325, 327, 328
- Latin America** See Argentina; Brazil; Colombia; Cuba; Guatemala; Mexico; Paraguay; Peru
- Lebanon** 289-291
- Lighthouses** 190-192; Ceylon 40
- Lincoln, Abraham** 198-199; statue 354
- Logs and logging** Thailand 96; Vancouver 82
- Machinery** mining 346, ice 154-155; lathe 27; rope-making 195; Zeta 367 See also Oil
- Mackinac Island** 335
- Maine** boat races 341
- Malaya** 1-5
- Maps** Africa 179, 219; Alabama 116; Balearics 18; Bounty route 159; Brazil 350; Canary Islands 352; Ceylon 41; Inside Passage 339; Iraq marshland 247; Mason-Dixon Line 177; Nautilus route 251; Near East 232; Nepal 127; Northwest Passage 54; Pacific islands 207; Paraguay 147; Sargasso Sea 9; Saudi Arabia 71; Sumatra 315; Washington, D. C. 199
- Marine biology** giant clam 138; ocean depths 371, 372; Sargasso Sea 8-9; sponges 166-168 See also Fish and fishing
- Marken Island, Netherlands** 152-153
- Markets** Algeria 220; bazaar 70; Belgian Congo 73; boats 95, 183; Guatemala 324; hat shop 52; Southern Rhodesia, shops 222; straw 187; Timbuktu 221
- Marsh dwellers** Iraq 246-249
- Mexico** 49-53
- Michigan** 334-335
- Mines and minerals** aluminum 340; asbestos 28; asphalt 141; bauxite 32; cassiterite 75; coal 25, 35; copper 51, 52; gypsum 78-79; iron, open pit 346; Israel 257; pitch 141; tin 3, 5 See also Greenland; Trees, Petrified Forest
- Minnesota** 346-348; Christmas trees 131
- Missouri** one-room school 68-69
- Mongolia** wild asses 162, 163
- Monroe, James** 330-331
- Morocco** 85-88
- Mountains** Alps 241-245, 333; Andes 170, 306, 307; Appalachian 22-24; Atlas 65, 87; Belgian Congo 76; China 327; Coast 82, 84; Guatemala 322; Hawk 66-67; Juneau 340; Matterhorn 244; moon 122-125; Puerto Rico 128, 129; Queensland 138; Roan 342-343; Rocky 99; Sakura Jima Volcano 110;

# Index

Volume XXXVI, Numbers 1-30 Entries signify both pictorial and written matter.

- Aden** camels 42; U. S. Navy carrier 112
- Africa** crossroads 217-224; elephants 265; fish 89 *See also* Algeria; Belgian Congo; Egypt; Ethiopia; Federation of Rhodesia and Nyasaland; Morocco; Tunisia; Zanzibar
- Agriculture** Balearics 19; Ceylon 38, 41; Channel Islands 263, 264; Ethiopia 203; Israel 253, 255, 256, 258; Kansas 298, 299; Lebanon 291; Luzon 194-195; Mexico 51; Minnesota 347; Morocco 86, 88; Norway 270; Okinawa 208, 209; Paraguay 146, 148; Puerto Rico 128-129; Queensland 137-138; U. S. 31, 33, 62-63, 116-117, 118; Wales 35; Yemen 233; Zanzibar 179, 180 *See also* Buckwheat; Cranberries; Pumpkins; Sugar cane; Tea; Trees
- Alabama** 116-118; Russell Cave 252
- Alaska** 338-339, 340
- Algeria** oil 224
- Animals** antelopes 162; asses 162, 163, 266; bear 23; camels 42-43, 217, 218, 231; cat 149; cattle 51, 137, 219, 300, 302, dairy 262, 264; cheetah 162; deer 349, 356, 357; dingo 77; dogs 114-115; donkeys 14, 16; elephants 41, 96, 126, 265, 268-269; fox 356; giraffe 162, 163; horses 61, 86, 243, 301, 302, 305; llamas 170; manatee 310; monkey 3, 4; otter 174-175; oxen 203, 222; rabbit 357; raccoon 6-7; rhinoceros 162-163; sheep 35, 304, 306; speeds 162-163; toad 357; water buffalo 194, 246-247
- Antarctic regions** Captain Cook 312; Antarctica, South Pole Station 133-136, 364-365, Trans-Antarctic crossing 366
- Appalachian Trail** 22-24
- Arabian Sea** 112-113
- Arctic regions** Greenland icecap 154-156; Northwest Passage 54-57; submarine voyage 250-251
- Argentina** 301-305 *See also* Tierra del Fuego
- Arizona** Grand Canyon 10-11; Petrified Forest 344-345; wildlife 349, 356-357
- Arkansas** 31-33
- Art** Indian 64 *See also* Crafts; Crayons
- Asia** elephants 268-269 *See also* Aden; Burma; Cambodia; Ceylon; China; Iraq; Israel; Japan; Laos; Lebanon; Malaya; Mongolia; Nepal; Philippines; Saudi Arabia; Sumatra; Syria; Thailand; Turkey; Viet Nam; Yemen
- Astronomy** meteorites 292-293; moon 122-125; sunspots 17
- Atomic energy research** 367
- Aurora borealis** 272-273
- Australia** boomerang 173; dingo 77; Queensland 137-138 *See also* New Guinea
- Aviation** airliner 218; helicopter 99; jet bomber 88; police plane 185; seaplane 348 *See also* Civil Aeronautics Administration; Rockets
- Bahamas** 186-187
- Balearic Islands** 18-19
- Balloons** *Explorer* 320-321, 363
- Bathyscaphe** 372
- Belgian Congo** 73-76
- Belgium** Brussels World's Fair 12 *See also* Belgian Congo
- Birds** bald eagle 60, 66; birds of prey 66-67; egrets 139; migrations 30; quetzal 324; songbirds 294-295; sparrow hawk 357 *See also* Sanctuaries
- Boats and ships** *Bounty* 157-161; canoe 348, log 337, marsh dwellers' 246; carrier 112; Columbus's 8; cruise 271; dhow 112-113; fishing 65, 187, 214; freighter 83; ice-breaker 54-56; Inside Passage 338, 340; Intracoastal Waterway 212-215; longboats 160; markets 95, 183; ocean liners 228; ore 340, 346; outriggers 311; river 74, 171, 221, 326; rowboat 175; sailing 191, children's races 341; sampan 325; sponge-diving 166-167; square-riggers 36; submarine, nuclear 250-251; tanker 106; U. S. Coast Guard cutters 54-57
- Brazil** new capital 350-351
- Bridges** Galata 165; Lions Gate 83; Mackinac 334; Manhattan 227; Potomac 178; Rainbow (natural) 90-91; Triborough 227
- British Commonwealth** *See* Aden; Australia; Bahamas; Canada; Ceylon; Channel Islands; England; Federation of Rhodesia and Nyasaland; Gibraltar; Malaya; Pitcairn; Trinidad; Wales; Zanzibar
- Buckwheat** 332
- Burma** 181-185
- California** bristlecone pine 260-261
- Cambodia** 328-329
- Canada** 259, 272; Chubb Crater 293; Vancouver 82-84, 339 *See also* Inside Passage; Northwest Passage
- Canary Islands** 352-353
- Caves** *See* Alabama; Dwellings
- Ceylon** 37-41; elephants 269
- Channel Islands** 262-264
- Chesapeake Bay** sailboat race 337
- Chile** *See* Tierra del Fuego
- China** 326, 327
- Christmas** candy 121; trees 131-132
- Civil Aeronautics Administration** 358-359
- Colombia** 103
- Columbus, Christopher** 8, 9
- Cook, Capt. James** 311-312
- Crafts** copper 150; dolls 109, 111; fabric painting 1; footwear 152, 197; ivory 16, 75; raffia 19, 73; straw 187; wood 27, 193
- Cranberries** 92-93
- Crayons** 200-202
- Crossfield, Scott** space flight 361, 362
- Cuba** 308-309
- Dancers and singers** Argentina 305; Balearics 18, 19; Cambodia 329; Ceylon 37; Thailand 94; Trinidad 140; Yemen 233
- Dwellings** Balearics 19; Canary Islands, caves 353; Iraq, reed 246-249; James Monroe 331; Lafayette 21; Laos 325, 328; Luzon 196-197; Marken 152, 153; New Guinea, thatched 188; Northern Rhodesia, thatched 28; Peru, stone 172; Puerto Rico 130; Queensland 138; Sahara, domed 220; Spanish caves 145, 150-151; Sumatra 316; Yemen 232 *See also* Lighthouses
- Edgerton, Dr. Harold E.** 371
- Education** foreign teacher program 296-297; Inns of Court 44-45; Mexico 53; Missouri one-room school 68-69; Morocco 88; oil op-


## MAN SCANS DARK UNDERSEA WORLD

**F**OR centuries, the question haunted men: How does the frontier beneath the sea look? Now we know, thanks to photography.

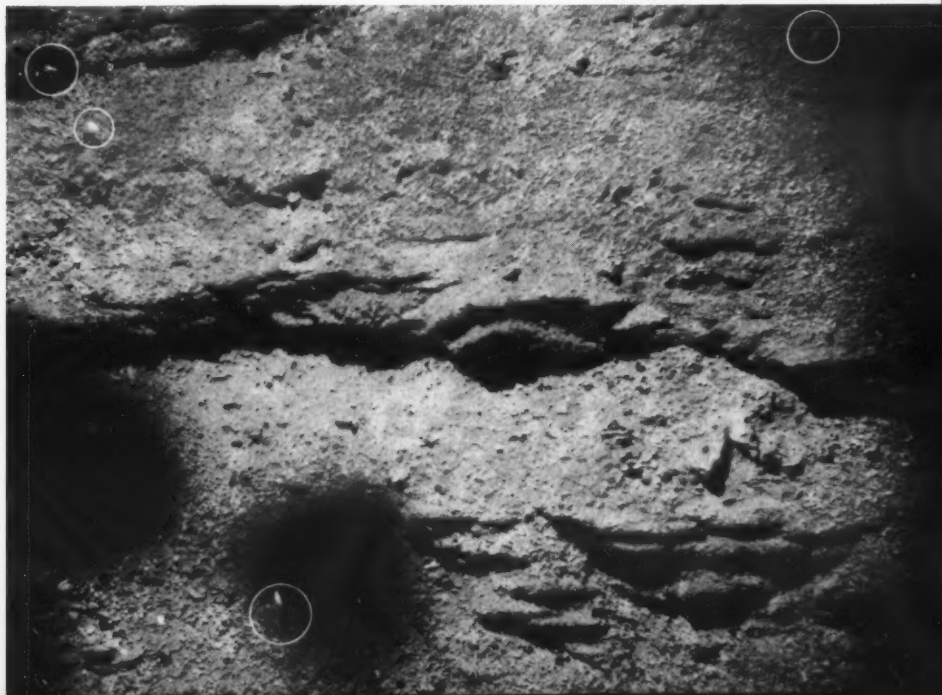
Dr. Harold E. Edgerton (left), professor of Electrical Measurements at Massachusetts Institute of Technology, broke the mysteries with a deep-sea camera, invented with the aid of research grants from the National Geographic Society. Lowered by nylon line, the instrument withstands a pressure of 17,000 pounds per square inch. This is more than the pressure of water at the greatest known ocean depth—the 35,640-foot Challenger Depth near Guam.

Once the Edgerton camera was lowered nearly three miles into the Mediterranean. In the black abyss, its quick eye recorded some shrimps, one small fish, and an old tin can. Unreckonable billions of animate and inanimate objects await the deep-sea photographer's figurative "Hold it, please." A huge region of the earth awaits discovery by this scientific eye. S.H.

PHOTOGRAPHS BY HAROLD E. EDGERTON



DR. EDGERTON'S camera, fitted into a steel cylinder, has dropped to a depth of 24,600 feet to photograph Atlantic's Romanche Trench (*National Geographic Magazine*, March, 1958). There it made the picture below, man's deepest view. Organisms, circled, prove the presence of life.



- Switzerland 115; Wales 34, 35; Yemen 230, 233
- Musical instruments** 2, 186, 305
- National Geographic Magazine** 36, 39, 59, 88, 91, 113, 125, 127, 130, 134, 138, 139, 145, 151, 157, 158, 161, 165, 187, 209, 214, 216, 233, 244, 248, 261, 271, 272, 290, 293, 303, 319, 338, 339, 342, 344, 356, 364, 371
- National Geographic Society** 47-48, 57, 59, 116, 118, 124, 125, 135, 136, 154, 170, 216, 252, 260, 293, 297, 312, 318, 320, 327, 332, 371
- National Monuments** Petrified Forest 344-345; Rainbow Bridge 90-91; Russell Cave 252; White Sands 78-79
- National Parks** Grand Canyon 10-11; Hot Springs 33; Kruger, Africa 265
- Nepal** 126-127
- Netherlands** Marken Island 152-153 *See also* New Guinea
- New Guinea** 188-189
- New Mexico** 78-79
- New York** Manhattan 226-228
- North Carolina** 342-343
- North Dakota** 225
- Northwest Passage** 54-57
- Norway** 270-271
- Ocean depths** 371, 372
- Oil** 97-108; Algeria 224; Burma 184; Saudi Arabia 70-72; Sumatra 315-316
- Okinawa** 205, 208-209
- Oklahoma** 61-64
- Pacific** 311-312; island defense bases 205-209
- Paraguay** 146-148
- Pennsylvania** buckwheat 332; Hawk Mountain 66-67; oil well 100, 101
- Peru** 169-172
- Philippines** Luzon 193-197
- Pitcairn Island** 157-161
- Plants** flower carpet 353; poinsettias 138; reeds 246, 248; rhododendron 342-343; sargassum 8-9; Spanish moss 216 *See also* Agriculture; Trees
- Puerto Rico** 121, 128-130
- Pumpkins** 46
- Rain making** 185
- Religious rites** Greek 168; Moslem 70, 71
- Religious shrines** Algeria, mosque 220; Ba'albek, temple 289; Buddhist temple 182; Cambodia, Angkor Wat 329; Channel Islands, church 264; France, church 317; grotto church 151; Guatemala, church 323; Italy, church 333; Syria 15, 16; Zanzibar 180
- Rivers** Colorado 11; Congo 74-75; East 227; Harlem 227; Hudson 226, 228, Magat 194; Mekong 325-329; Niger 220-221; Potomac 178, 354; Zambezi 26
- Rockets** 142-143; Jupiter 142, 236; Vanguard 58-59; Viking 9 78-79; X-15 362-363
- Rubber** Malaya 3, 4-5
- Sanctuaries** Arizona, Desert Museum 349, 356-357; Corkscrew Swamp 216; Hawk Mountain 66-67
- Sardinia** 80-81
- Sargasso Sea** 8-9
- Satellites** artificial 58-59, 235-237; 318-319, 320
- Saudi Arabia** 70-72 *See also* Arabian Sea
- Siple, Dr. Paul A.** 364
- South Dakota** balloon flights 320-321
- South Pole** 133-136, 364-365
- Space** first manned-flight 362-363; terms used 59 *See also* Rockets; Satellites
- Spain** caves 145, 150-151 *See also* Balearic Islands; Canary Islands
- Sports** ice hockey 259; skiing 241, 244-245
- Statues** Jefferson Davis 116; Mayan figures 49, 323; Sphinx 234; totem pole 83; Washington, D. C. 354-355
- Sugar cane** Cuba 309; Puerto Rico 121, 128-129; Queensland 138
- Sumatra** 314-316
- Switzerland** 241-245; St. Bernard 114-115
- Syria** 13-16; Egyptian union 230-231
- Tahiti** 311
- Tea** Ceylon 39, 41; Paraguay 148; Tunisia 267
- Tennessee** 342-343
- Texas** oil gusher 101
- Thailand** 94-96; elephants 268, 269
- Tierra del Fuego** 306-307
- Transportation** carriage 335; crossroads 217-228; ricksha 40; royal car 127; street-cars 223; tractors 38, 62, 86, 131, Antarctica 366; train, narrow-gauge 343; trucks 72, 107; Turkey 165; wagons 61, 306, 309 *See also* Animals; Aviation; Balloons; Bathyscaphe; Boats; Rockets; Waterways
- Trees** bristlecone pine, oldest 260-261; cherry 274-276; Christmas 131-132; Petrified Forest 344-345
- Trinidad** 140-141
- Tunisia** 266-267
- Turkey** Istanbul 164-165
- Undersea exploration** 371-372
- Union of South Africa** elephants 265
- United Arab Republic** 230-231
- United States** birds 60, 139, 294-295; Civil War 198-199; defense bases 206-209; foreign teacher program 296-297; Intracoastal Waterway 212-215; Mason-Dixon Line 176-178; Midwest 225; presidents 198-199, 210-211, 330-331; westward expansion 61, 62 *See also* Agriculture; Alaska; Appalachian Trail; Civil Aeronautics Administration; Cranberries; Indians; Lafayette; Lighthouses; Puerto Rico; Rockets; Satellites and names of states
- U. S. Army** balloon flights 320-321
- U. S. Army Engineers** Greenland 154-155
- U. S. Coast Guard** Northwest Passage 54-57
- U. S. Navy** Arabian Sea 112; *Nautilus* trip, Arctic 250-251; Pacific 206-207
- Utah** Rainbow Bridge 90-91
- Viet Nam** 326, 329
- Virginia** 330, 331
- Wales** 25, 34-35
- Washington, George** 210-212, 275
- Washington, D. C.** airport 358-359; cherry blossoms 274-276; Civil War 198-199; statues 354-355
- Water supply** aqueduct, water wheel 13; gumbos 203; irrigation project 171; Luzon 194; oasis town 220 *See also* Rain making
- Waterfalls** Japan 111; Norway 270; Victoria 26
- Waterways** Intracoastal, U. S. 212-215 *See also* Inside Passage; Northwest Passage
- Wyoming** oil surveying 99
- Yemen** 229, 232-233
- Zanzibar** 179-180







## Man's Questing Knows No Bounds

The Edgerton camera has plumbed extreme depths of the oceans.

Thanks to French naval designers, men, too, have trespassed on this dim frontier to a depth of 2½ miles.

Their bathyscaphe (right) has been called a "wonderful new dirigible of the depths."

It carries 20,000 gallons of lighter-than-water gasoline to "inflate" the hull and give it buoyancy. Lead shot serves as ballast, as it does in a balloon.

From pressurized gondola, scientists look out on the undersea world, lit by spotlights.

Painting shows the bathyscaphe exploring a murky canyon off the coast of Portugal.

Weird plants gesture at the intruder. Dogfish sharks glide by, their eyes white and bulbous in the dark.



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